

*The*  
**BIRTH BOOK**  
Your guide to a positive birth experience

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**PROF STEPHEN TONG**

*To Carol, Katrina, Laura and Poppy,  
and to the many whose births I have been privileged to attend*

# Contents

# About the Author

An Asian Australian, from a migrant family and schooled in the public system, Stephen climbed to become Professor by age 39.

Now a leading Professor of Obstetrics, he juggles two careers. As a specialist obstetrician, he has been providing pregnancy care for two decades. Over a long career he has kept a friendly, watchful eye over many normal births, lent a helping hand for births that needed one by performing thousands of caesars, or forceps births. And on occasion, has led clinical teams that have worked together with haste to save a life.

As a research academic, Stephen directs a global web running research programs across four continents. His big research team is hunting for discoveries to make pregnancy safer for mums and their unborn babes. Together, they are tackling life imperilling conditions - stillbirth, preeclampsia and ectopic pregnancies – by inventing and testing new cutting-edge diagnostic tests, or drug treatments.

Stephen has dedicated his life to finding better ways of ensuring safer motherhood and birth.

Connect with Stephen:  
(insert social media handles)

# Praise for *The Birth Book*

"Finally a birthing book that delivers facts in a non-judgemental, warm and witty way that will leave mums-to-be feeling informed and empowered. Stephen's unique way of approaching birth, one that is steeped in science but swathed in soul, is an uplifting one that brings joy and laughter instead of fear and tears to the birthing suite."

Dani Venn, Celebrity Chef, mum of two

"Empowering yourself with the knowledge needed to navigate childbirth. This book is fun, easy to read, educational and will have you laughing and even crying sometimes. An absolute must read for expecting parents and their support team. I can't recommend it highly enough."

Associate Professor Cathy Cluver - Pregnancy Researcher in Cape Town, South Africa. Mum of three.

"This book is going to save so much googling time for women before their birth. It's all there, everything you need to know, with a bit of kookiness along the way. I really think it will help so many anxious women feel more prepared for their birth and give them the best gift ever- enjoying the best day of their life, with no worries."

Kristie Gatanios, professional singer, mum of Pia  
"A fascinating, refreshing, easy read about the final step on the journey to motherhood. This book includes everything I wish I knew about birthing before I arrived in the birthing

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suite. Humourous anecdotes coupled with a clear, unbiased and supportive view on what to expect make this a must-read for every Australian soon-to-be Mum and her birthing team."

Sarah Ng, banker, mum of three.

"An informative and entertaining 'road-map' towards birth and the many different routes the journey might take you on. A must read for the pregnant person as they head towards delivery day"

Associate Professor Tu'uhevaha Kaitu'u-Lino,  
Pregnancy Researcher, mum of four

"A humorous and informative account of labour and birth. A realistic account exposing the truth behind one of the most intimate experiences in human life. Prepare yourself for a brilliantly written journey of laughter and enlightenment."

Alison Abboud, midwife

"It's like no book that I read before the birth of my three children, and without a doubt the one book that I needed. It's a raw unbridled look at the wonder of childbirth that will empower and prepare any expecting mother."

Melissa Wilson, teacher, mum of three

"Hugely informative, witty and compassionate, this book completely demystified birth. I was walked through every step of labour including what happens when things don't go quite to plan, and my options are along the way. Most importantly, this

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book is free from judgement and opinion, offering only decades of experience and easy to understand evidence. An essential read for all pregnant women, partners and support people.”

Dr Roxanne Hastie, Pregnancy Researcher, mum of Charlie

“Filled with Stephen’s unique wit and humour, *The Birth Book* presents a comprehensive and evidenced-based journey into labour and birth that is an enjoyable and easy read. This book provides a much needed window into the world of pregnancy and obstetrics that will arm expectant mothers and their support people with an idea of what to expect on the big day of birth. Stephen's book is approachable, amusing, and heartfelt.”

Alex Roddy-Mitchell, midwife

# Foreword

**W**elcome to *The Birth Book*! If you have picked this up, it is probably because you- or someone dear to you- is approaching the time of birth. Congratulations! This is an incredibly exciting time in your life. The arrival of a baby heralds an exciting new chapter for everyone in your 'village'. Families and friends stand together with new parents in a shared vision: that love will surround our children all their lives, that good fortune and health will follow them, that we will help launch them into a life of unlimited possibility, that we- through them- will leave this world better than we found it.

Which brings us to the all-important launch pad. Few of us will experience the astronaut's walk to the Kennedy Space Centre launch pad at Cape Canaveral, but many women approaching the day of birth can probably relate to the mixture of intense excitement and nervousness. The sharpened focus. The comfort of customs and rituals that tether us to what makes meaning for us. The immeasurable value of your faithful flight crew on the day and your wider support crew on the ground. But the other thing that can help to ensure this is less of a 'white knuckle ride' is knowledge of what's going on, and trust in the team looking after you. In the launch pad of the birthing suite, this is the midwives, nurses and doctors, and our sole job is to take care of you all- mother, baby and family. To put you at ease. To share with you what's happening and why. To ensure no one is left behind. In short, to ensure a safe and happy birth day.

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If this resonates with you, then Professor Stephen Tong's book will hit the mark. Stephen is a highly experienced obstetrician, who I have had the pleasure of working with in the public and private sector over many years in Melbourne, Australia. He is also one of our nation's finest researchers. He has dedicated his life to discovering new and better ways of ensuring safer motherhood and the best possible start to life. He has made world leading discoveries into some of the most perilous complications of pregnancy- stillbirth, preeclampsia, ectopic pregnancy and others. It is true that not all heroes wear capes.

Stephen also has an uncanny ability to distill the essence of a clinical or research problem, and explain it in a thoughtful, kind and wise way that makes sense- peppered with (sometimes quirky but always illustrative!) anecdotes. This is the real art of the clinician or academic- to bring others along with you. I will often walk past his office where he will be shaping a PhD student's research presentation and hear him say, 'You need to tell the story so your grandmother will understand it'. It misses the point if our research or education is impenetrable to the people we are trying to empower and help.

It is this philosophy he has brought to 'The Birth Book'. Pregnant women, together with their partners and support team, are bombarded with a lot of information about birth, but the challenge for many is to make sense of it all. This book picks some of this information apart, and then knits it back together into a short, digestible companion for labour and birth. Of course, this garment is not a 'one size fits all'. Nothing can replace the individualized advice and recommendations for you, your baby and circumstance. But this book gives you an important place

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from which to start the conversation. Here Stephen walks you through the stages of labour and birth, and how we keep mum and baby safe. He explains exactly how different forms of pain relief work so you can help decide what might be best for you. He guides you through the evidence so you can understand- and share in- the clinical decision making that surrounds induction of labour and assisted birth, including caesarean section. He also takes you down some of the roads less travelled in the birthing suite like heavy bleeding after childbirth, so you know how the expert team in Mission Control will spring into action if needed. He might be your invisible partner on the big day, quietly saying, 'Remember we talked about this? This is all OK'.

Importantly, he has presented this in a way that is both calm and informative. We are living through a strange time in history, where information sharing about COVID-19 has made us all armchair experts in pandemic epidemiology, aerosol transmission and the nuances of vaccine effectiveness. Like me, you probably have wise, trusted sources to whom you turn for balanced scientific information- free of political bias, hysteria, hidden agendas and baseless conspiracy theories. Such a source is The Birth Book. Your 'access all areas' backstage pass for what goes on behind the birthing suite doors. It is the balanced, 'expert in your pocket' for the big day who- along with wonderful midwives, doctors and childbirth educators- will shepherd you through.

Of course, I'm sure the moment of rocket launch is incomparable to the magic of space travel. The richness that you, your partner, family, customs and traditions bring to your birth and parenting is immeasurable. None of us can replace or replicate it. Ensure this is all part of your birth plan, too. It is

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your fingerprints, not ours, that belong on your baby's head. Our role- and the intention of this book- is simply to partner with you for the big day: to share our language and customs, to make the birthing suite, its people and practices a warm and familiar place. To provide a confident 'go for launch'. I wish you the most wonderful birth day, and joys untold in your yet-to-be-charted voyage of parenting.

Sue Walker, AO

Professor, Obstetrician, Maternal-Fetal Medicine Specialist

# Introduction

**W**hich day was the most important day of your life? The most memorable? If you ask a mum, the day she gave birth is going to rank highly. For many, it'll top the list; placed above her 21<sup>st</sup> birthday bash (fogged by alcohol), the elation of graduation day, or even that dreamy tropical holiday where she impulsively offered a sip of her tangy strawberry daiquiri to a lonesome stranger, now her loving life partner.

For those who have opted to marry giving birth is likely to be up there with the day of their wedding. And that would be a fair call. Both days, highly memorable, ink permanent spots on the rest of her life. One unites them with a life partner to face the world. The other brings the joy – and challenges – of a child to shape, love and nurture.

Both an upcoming wedding and looming childbirth can be anticipated months before (barring hasty decisions in Vegas by couples swept up in the moment of glitz, cheap beer, and a noisy lights and sirens win at the slot machines). It is therefore a touch curious that these impending occasions are approached so differently.

Courtesy of endless evenings, late nights and weekends consumed by meticulous planning, a bride-to-be is going to know a lot about her wedding well in advance. To the minute detail. She'll know what will be uttered at the ceremony (to the word), be affectionately familiar with every microscopic detail of the ring that will soon adorn her finger (dollar amount and probably

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the clarity scale of every tiny rock embedded within the glinting band), and exactly where everyone will sit at the reception (with particular thought invested into placing her future mother-in-law). She will know exactly what meals will be served, chosen after much indecision and angst from a delectable listing, which is a little ironic because she is going to be too busy to taste any of it while it is still warm and on the right side of tasty.

In contrast, many will face the day of childbirth knowing a good deal less about what's in store. They may be aware – with some trepidation – that labour will hurt and that at some point they'll need to push hard. Really hard (this is, in fact, true). They will just hope a baby is born naturally, with no tearing.

They might have heard about caesarean sections and forceps, but many won't know much about them – why they're done, how often they're done, how they're done. They will just hope these won't be done to them.

I suspect that many expectant mothers stumble into labour knowing far less than they may wish to about a big day that could end with a vaginal birth, a forceps or vacuum birth, or a caesar. Many will have gathered their sum knowledge of childbirth from a few evenings of birth classes (which are valuable for sure but perhaps cannot hope to cover many facts women may wish to know) possibly coloured by animated accounts from friends with varying birth experiences. It is a scary thought that many will know far more about the unsavoury habits, dreams and desires of their favourite reality TV star than what could befall them in the birth suite.

And so, I offer this book so that expectant mums can step into the birth day empowered by knowledge. Because knowledge

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can remove fear. Removing fear can make childbirth more rewarding. And a rewarding childbirth is a perfect springboard to motherhood.

Modern women making their mark in this frenetic world are busy people. Their time is precious and should be respected. And let's face it, planning a wedding is way more fun than boning up on the finer points of childbirth. Therefore, I have tried to keep this book short; it's an easy read that can be digested with focused reading in lieu of a few evenings of Netflix. And perhaps a thumb-through closer to the big day.

I have also written this for birth partners and the privileged few invited to support someone giving birth: mums, dads, sisters, friends and so on. This book will help them learn about what might happen and why they play such a valuable role merely by being there.

What may set this book apart from the remarkably few on the topic of birth (there are loads more suggesting ingenious ways to declutter, or how to say no) is that I am completely neutral. I write with no staunch philosophy on how women should approach labour. I simply aim to offer the facts on modern, safe obstetrics care that has evolved and been refined over centuries. I am just as delighted whether women decide to give acupuncture a shot, opt for hypnobirthing or other meditation techniques to manage pain during labour, content to simply play it by ear on the big day, wish to avoid an epidural, red-hot keen for an epidural to be slotted in as early as possible, or have even made their own informed decision to birth via a planned caesarean section. I hope this book can help them with all those decisions.

### *Alice's two birth experiences*

Let's begin by reflecting on two very different birth experiences.

#### *Experience 1*

Arms enveloping her precious newborn, Alice was amazed how smoothly it went – a view affirmed by her midwife Jane, who agreed it was quite the dream birth. Sure, the pains of labour were no fun, but Alice had weathered them with the support of Jack, Jane, the soothing tones of Enya and a purple bouncy ball. After arriving at the birth suite just after eight, she'd had a pleasingly rapid labour and reached full cervical dilation by mid-morning. Just three robust pushes and baby Lucinda emerged. No tearing. The placenta slid out quietly, almost unnoticed. A beam of glorious sunlight shot forth through the window, a golden beam of radiant warmth bathing mother and cooing newborn.

#### *Experience 2*

The day started well. Alice arrived at the birth suite by sunrise. Greeted with a smile from Jane the midwife, her labour was in full flight by mid-morning. But as labour stretched into the afternoon progression had stopped, though the excruciating pains persisted. By late afternoon Alice, already exhausted, was informed that her cervix had remained stubbornly unchanged at 5 centimetres dilatation. Passage of the baby down the birth canal had stopped dead halfway to full cervical dilation. She was told she had probably stopped dilating because the baby was in a posterior position – baby's back lined up directly with hers and

the baby faced upwards towards the ceiling. Apparently, this slows labour. A drip was now needed to strengthen the contractions. It was going to be a long birth.

With the drip ramping up the contractions (and the pain), by late evening Alice slowly edged to full dilatation. She then pushed for two hours, an ordeal that was way harder than she had imagined. Dripping with sweat, exhausted to the bone and now running a fever, she was crestfallen that no baby had appeared. Labour remained upon Alice.

Things then became more urgent. During all the pushing the baby's heart rate sped up. The continuous fetal heart rate monitor that had been on all afternoon had noticeably quickened in pace; it was now tapping at a seemingly improbable 180 beats per minute. Without knowing what it all meant, the noisy uptick in the speed of the fetal heart struck terror in Alice.

Night – day – night. Trapped in a long unrelenting labour. How was the baby going to get out? Will it ever? A doctor then drew up a chair beside Alice. She gathered a tense smile and murmured softly, 'The baby is still facing the wrong way. It's getting distressed. We need to chat...'

You don't need to have given birth before to realise that if given the choice, we'd all run with the first scenario. I would like to offer a few thoughts as we mull over these birth experiences.

First, I am happy to say that a vaginal birth is more likely than a labour that runs aground. Most vaginal births do not flow quite as smoothly as Alice's 'made for TV' birth in the first vignette (though I have indeed witnessed a few that were pretty

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close), but most will get there.

However, even for those destined for a vaginal birth I suspect that the experience could be made far more rewarding and less scary if women knew more about it before it happens. A somewhat extreme analogy may be to imagine a young adult emerging for the first time from sheltered tribal life, previously hidden away on a dense jungle island. Still dazzled by the bling of modern technology, they are booked to hop on a commercial long-haul flight (clearly paid for by an opportunistic promoter) but knows nothing about planes. Never seen one before. Now, because they are flying with a reputable airline you and I know that they will safely reach their destination (statistically a far safer journey than the next one, where the sleezy promoter picks the chap up at the airport in his hotted-up red Porsche). But isn't it likely that we could convert a terrifying experience into an enjoyable one if they were told some basic facts before the flight? That turbulence can happen but is usually perfectly safe, variably tasty meals will be served on very small trays, steer clear of grumpy-looking cabin crew, it's best to surrender all armrest real estate to the tattooed beefcake next to them, don't make eye contact with the crew member selling duty free, and anticipate the evils of jetlag.

Similarly, I would imagine women will find the journey of a vaginal birth less scary and more fulfilling if they have a good handle on what *could* happen. Hence, most of this book will be spent walking the reader through 'plan A' – a vaginal birth. I cover how long labour lasts, pain relief options (including the ins and outs of an epidural), why vaginal examinations are done, why we doctors and midwives take such a keen interest in the

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baby's heart rate patterns during labour, why tearing happens and how it is safely mended, what placentas are for and what is done to keep women safe if they start to bleed heavily after the birth. And, importantly, how to push.

The scenario of an obstructed labour – one that does not progress and needs some medical assistance – is not that uncommon. It happens, I'm afraid. And perhaps more often than you'd might think. It may surprise you that around 30–50 per cent of first-time mothers in Australia need a helping hand to birth their child, either by forceps, ventouse (or vacuum – I use these terms interchangeably in this book) or a caesarean section.

This leads me to my second thought. For women going into labour, the way a baby will be ultimately birthed is uncertain right up until the end. When you think about it, it's amazing that, even in this day and age, when expectant mothers step into the birth suite no-one can safely predict whether she will wind up with a natural birth, forceps or a birth by caesarean section. Often, we will only find out within the last hour before birth itself. This is particularly true for first-time mums. We can guess with more confidence that a second-time mum who had a prior vaginal birth is very likely to do it again. Therefore, it may be worth knowing about all the paths to birth before the big day because no-one knows which will happen for the birth that you will be involved in.

My last thought concerns time. Once a clinical decision is made to proceed with forceps or a caesar, events move swiftly. A common reason why we need to act with haste is that we may be concerned that the baby is coping badly with the stress of labour; he is suffering from a poor flow of oxygen and at risk.

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This makes things time critical. Most forceps or vacuum births are completed within half an hour of the decision that one is needed, and caesars are done within an hour or two.

This presents a difficult practical dilemma: once a medical decision has been made to undertake a forceps or a caesar, there is a terribly short window of time for the clinical team to tell women all about the procedure and why we recommend it. And often little to no time for women to digest it all. This is not ideal.

What's worse is that when we are trying to feed quite a volume of important information to women within the shortest possible time, they are often in the midst of a brutally long labour. They are simply exhausted and aren't in the best state to intellectually engage with a barrage of facts lobbed at them.

There is no easy solution. Having managed this stuff in birth suites for some 20 years now, I reasoned that one answer is to offer information in a book that expectant women (and her nominated support team for the big day) can absorb at their leisure, well ahead of birth. By acquiring knowledge in advance, women will be in a better position to offer true informed consent if their labours stray off the path of a vaginal exit for baby. The procedures recommended may become far less scary if women knew a lot about them beforehand.

The layout of my book is straightforward. Chapter 1 is an overview of labour and childbirth and the whole process leading up to the big moment. We then take a closer look at pain relief options in Chapter 2. Chapter 3 covers ways labour can begin – naturally or with some prompting. Chapters 4, 5 and 6 step through the three stages of labour. Finally, we turn our minds to the plan Bs of childbirth: assistance using forceps or ventouse

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(vacuum), and caesarean sections (see Chapters 7 and 8).

I address you, the reader, throughout the book, but because the reader may not always be someone who is expecting, I refer to the person giving birth in the third person – ‘mum’ rather than ‘you’. Note that I’ve used ‘mum’ – so I didn’t have to use ‘the mother’ or ‘the woman’ all the time; and that’s how we refer to them in the biz – ‘mums’. I have used the pronouns she/her for the birthing parent. I have mainly referred to the birthing partner as exactly that (or used gender neutral terms), but on occasion refer to them as he/him, spouse or dad. I realise these descriptions may not represent all the wonderful faces of modern parenting and I apologise if the text does not always suit the pronoun (or relationship status) that you identify with.

Sometimes, rather than using the clunky ‘his/her’, I simply refer to the baby as ‘him’ or ‘her’; for example, ‘the baby switches to her own lungs to draw breath’ or ‘for additional clues as to which direction bubby is facing, we can also try to feel where his ears are’. When I talk about ‘we’ I usually mean the clinical team in the birth suite; for example, ‘this is how we induce labour’; but other times ‘we’ means you, dear reader, and me as we travel on this marvellous journey together.

My singular aim for this book is to demystify the safe, modern care of labour and childbirth so that potentially frightening birth experiences are replaced by rewarding events that become cherished lifelong memories. So, let’s begin...

## Chapter 1

# A day to remember: the journey of labour and childbirth

In this era of a stupidly expansive range of brain-rotting movies that can be instantaneously streamed at a tap of a button, I often dig around the internet to choose one worth watching. A spot of systematic, methodological market research. First, I scroll about the Netflix site eyeballing the bamboozling array of movies I can pick. I might do a few specific searches just to be sure (yet again) that the blockbusters I actually wish to view are still not available on Netflix, although I will always be reassured there are 20 on offer that are similar (according to Netflix anyway, though I imagine they will be more B-grade and far less blockbustery).

After half an hour of indecision, I shortlist a few: an intellectually driven choice based on high quality information – the title alone and whether the movie poster the size of a postage stamp catches my eye above the many other tempting offerings tiled around it.

To make a final choice among my shortlist I turn to that most reputable source of erudition, the knowledge fountain of pure truth. Wikipedia. There, I hunt for snippets on each movie with keen regard, facts that in all probability have no relevance as to how much I will end up enjoying it. The Wikipedia entry provides

the Rotten Tomatoes score and I am turned off if it is lower than 35 per cent. (Unless the film includes Jason Statham, an underrated classical actor who never fails to dispatch baddies in a most satisfying ‘butt-kicking’ manner whether it is a menacing gangster or a gigantic prehistoric megalodon shark who is a little perplexed why it finds itself paddling about crowded beaches of modern-day China but is nevertheless feeling peckish..) Finally, I do a little maths, deducting the cost to make the film from box office earnings to see whether it was a hit or a flop.

But here is the thing. I am always super careful to avoid the plot summary that lurks on the same Wikipedia webpage. If I accidentally read the plot twist, I bin the movie (hey, there are gazillions more to choose from).

Well, this is what this chapter is: the plot summary of the book. The ‘beware, spoilers ahead’ movie review. Why would I add something like this when I am so careful to avoid spoilers myself? The difference is that this book is factual, and I am trying to convey information to busy readers in the most efficient way possible. And I think it is easier to learn something if you are first offered a skeleton of the topic. And that’s what this chapter aims to be. In subsequent chapters, I add flesh to the skeleton with more interesting detail.

So here it is. The plot summary of childbirth.

### **What’s inside the pregnant uterus?**

The unborn baby rests neatly folded within the uterus which, in essence, is a big bag of muscle. But what a remarkable one. In the non-pregnant state, the uterus is as small as a Josephine pear delicately perched upside down in the pelvis. When called to

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action it stretches. And stretches. Ridiculously. Without adding to its complement of existing cells, the bag that is the uterus elongates so magnificently that by the end of pregnancy it obligingly houses a baby of some 3 or 4 kilograms in weight contentedly sloshing about in 500 millilitres of straw-coloured liquid called amniotic fluid, which mainly comes from its bladder (it is a charming thought that we all begin life in utter darkness bathed in our own wee). In addition, the uterus also accommodates the dense, meaty placenta weighing in at around 600 grams. All held in without complaining, seemingly without effort, nice and watertight. A feat I daresay Elastigirl could not hope to match.

The opening of the uterus facing the birth canal is the cervix and it is a major player in childbirth. It is nestled at the lower end of the uterus and sits at the upper end of the vagina, or birth canal. Shaped rather like a mini donut, the hole in the middle of the cervix forms a continuous tunnel from the vagina to the inside space (or 'cavity') of the uterus where the unborn baby is housed. On the day of childbirth, the tiny hole in the centre of the cervix gapes to a whopping 10 centimetres, large enough to permit the baby to pass. Within minutes after the placenta is delivered the cervix closes rapidly. All in all, the uterus is one capable, stretchy organ.

The placenta is a fleshy disc with a remarkably similar diameter to a small pizza from Dominos, though a fair bit thicker. You may disapprove of my comparison as distasteful, but in fact 'placenta' and 'pizza' are both derived from the word 'cake'. It's not the prettiest things to look at, but what the placenta does is incredibly beautiful. During the long months of pregnancy, it is the life support system of the developing human.

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One side – the ‘maternal side’ – is firmly embedded in the inner lining of the uterine cavity. It’s the surface that sucks up nutrients and oxygen from mum’s blood. The maternal side looks like chunks of lumpy exposed flesh that are dark brown in hue with a shiny wet gleam. In fact, it doesn’t just look like that – it *is* that. Coursing along the surface of the fetal side of the placenta are a dense tangle of freaky looking chubby blood vessels, ones that Hollywood might use to adorn nasty alien beings with malicious intent. The placenta continuously sips oxygen and nutrients from mum’s blood which runs along the border of the placenta itself, and concentrates these goodies in the fetal blood, which is then gathered into major blood vessels that lead to the umbilical cord.

The umbilical cord emerges from the centre on the other side – the fetal side of the placenta. Some 50 centimetres in length, it floats about in the amniotic fluid as coiled loops. The other end of the cord ends at the belly button of the unborn baby, feeding the fetal blood vessels within the cord itself into the baby where they seamlessly join the fetal circulation.

In turn the placenta facilitates the disposal of waste products such as carbon dioxide, palming it off from the fetal circulation to the mother’s, to be harmlessly washed away. The placenta is the reason why unborn babies can thrive submerged in amniotic fluid – they are not using their lungs to inhale oxygen. We humans of now, and of generations past only exist – only have ever existed – because there was once a placenta sustaining us. A remarkable organ. It’s a bit sad we do not regard it with the respect it deserves. Instead, after birth we casually toss it into a yellow bag, earmarked for obliteration by extreme temperature incineration.

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Post birth, the placenta can emerge quite bloodied. And a little whiffy too. At times it can have a green tinge. Given its disagreeable appearance it's perhaps not surprising that the poor placenta often fails to feature in even a single photo among daddy's expansive happy snaps capturing the joyous day of childbirth. I just can't quite believe some people are moved to turn them into capsules and swallow them.

Extending outwards as continuous sheets from the edges of the placenta and draping the walls of the uterine cavity like a carpet are the placental membranes. 'They', for there are two layers, keep things watertight by holding in all the amniotic fluid in the uterus with the developing baby floating within. If the placental membranes spring a leak, amniotic fluid will drip (or gush) out of the vagina and this is what's widely known as 'the waters breaking'.

### **The length of pregnancy and labour**

The 'expected date of birth' or the 'due date' is traditionally calculated as precisely 40 completed weeks from the first day of the last menstrual period. It can also be determined by an ultrasound performed during the first trimester of pregnancy, as early as six to thirteen weeks. The ultrasound method is simple. We measure the length of the fetus – called the embryo at this early stage – and look up a reference chart. For example, an embryo measuring 15 millimetres in length (the 'crown-rump' length) will be seven weeks, plus six days old on the day of the scan. Then, from the date of the ultrasound we derive the expected date of birth by adding 32 weeks and a day (arriving at exactly 40 weeks and zero days).

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Dating a pregnancy by ultrasound is more accurate than calculating it based on period dates because natural variations in the length of menstrual cycles between women introduces uncertainty: dating according to period dates assumes an egg is released precisely 14 days after the first day of the last period, which is not always true. Also, many women are simply unsure when their last period began.

The expected date of delivery, or 40 weeks gestation, is an arbitrary line in the sand – very few women will birth on that exact day. Pregnant women become more and more likely to go into natural (or ‘spontaneous’) labour as they edge closer to 40 weeks gestation.

Most babies are born just before 40 weeks gestation; however, some will overshoot this auspicious day by a week or so. This can stress expectant women who are already on high alert, have their bags all packed (and for many, repeatedly repacked) and dismayed to find themselves still pregnant. They may become unsettled by a new numbering system, where counting towards 40 weeks abruptly pivots to counting upwards. One day over. Two days over. Tomorrow it’ll be three...is something wrong? Saintly patience is needed for women who glide past their due date and they should be reassured that many pregnancies do this. If labour hasn’t arrived by around 41 weeks gestation, women will be offered an induction of labour within the next week or so, as it can become too risky for babies to remain in the womb beyond 42 weeks of pregnancy. The reason is that by this time, many placentas are past their prime and the risk of stillbirth increases sharply. Chapter 3 talks more about spontaneous labour and how we give things a move along if needed.

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Labour lasts around eight hours for a first-time mother and is usually a fair bit shorter for those who have birthed before. However, there is dramatic variation in how long labour can last. Some first-time mothers are blessed with a speedy birth – aka Alice, vignette one (see the Introduction). But for those who do go quickly they should consider themselves warned that they risk becoming the focus of envy at future dinner parties if conversations dare stray into the fraught territory of personal childbirth experiences (and for the rest of dinner they get the cold shoulder from mums who endured an epic labour, aka Alice, vignette two).

Sadly, the eight hours only counts the period of ‘active labour’; where strong, painful contractions are in full flight. It does not include the many hours of ‘passive labour’, which is the slow build-up of uterine contractions. The passive stage can also be quick or hang about for days – a tiresome situation we call ‘spurious labour’.

Labour comes in three stages imaginatively termed the first, second and third (see Chapters 4, 5 and 6 respectively). The first stage starts with the arrival of active contractions and cervix dilatation and ends when the cervix is fully open, or ‘fully dilated’ (10 centimetres open). Most of the time spent in labour is during the first stage. And I am afraid it can get a little uncomfy. The second stage is declared at full cervical dilatation and is at an end with the arrival of baby. It lasts around one to three hours and includes the infamous period of pushing. Again, it can be far shorter, even a matter of minutes for some really lucky ones. The third and final stage starts from the birth of baby and ends when the placenta has slid out. This is usually done and dusted within 10–15 minutes, and should last no longer than an hour.

## Contractions, getting into labour and the first stage

One day, the uterus will start contracting. With each contraction the muscle fibres in the uterus shorten in unison and the uterus squeezes tight, then relaxes as the contraction falls away. Muscle fibres make up the upper and middle sections of the uterus whereas the lower third, called the 'lower segment', is made up of fibrous tissue that doesn't contract. Successive waves of muscle contractions squeeze the upper two thirds of the uterus, which edges the baby down slowly but inexorably (hopefully) through the birth canal. It is a little like squeezing the top of a plastic tomato sauce bottle to add a delicious condiment to a steamy hot dog. But with the minor difference that it can take eight hours of repetitive squeezing before anything emerges (at which time the hot dog might be less steamy).

What the uterus does really is remarkable. In a process that remains cloaked in mystery, the uterus somehow coordinates the simultaneous shortening (or contraction) of millions upon millions of single muscle fibres with a regularity that is impressively precise. How do they all know to contract then relax at the same time? (Are they telepathic?) Furthermore, this amazing structure lies dormant for decades with the annoying need for tampons being the only evidence of its existence. While pregnant, the uterus somehow knows to resist contracting for months on end despite being stretched terrifically, springs into frenetic action on that one special day of childbirth, then shrinks down to its former pear-like dimensions to resume quiet living.

In the beginning, the early contractions are not painful. It feels as though the uterus becomes tight as if it is scrunching

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into a ball, then relaxes again. This pain can be distinguished from ligament pain (a terribly common and pesky symptom of pregnancy) by the fact that it is centred on the uterus rather than lower down in the pelvis, they last around 10–15 seconds, and recur at roughly 10–15 minutely intervals. With time they gradually increase in frequency, strength and intensity. This is the above mentioned ‘passive stage’ of labour, and women are often encouraged to stay at home as it can last a while.

Eventually this build-up spills into active labour, where there may be three or more decent contractions within each successive 10-minute ‘block’ of time. Most birth suites will invite women in when they are feeling two decent contractions (each lasting at least 30–45 seconds) within every 10-minute block and this provides a pretty safe margin; it is very rare that women will not make it to the birth suite in time.

During active labour each contraction lasts around 60–90 seconds. There will be three to four of these within every 10-minute block of time. And I’m afraid the pain can be pretty intense. We staff in the birth suite will not be convinced that women are in active labour if they are able to comfortably chat during contractions. Thankfully, there is complete respite from pain between contractions and they magically cease the moment baby is born.

At the beginning of active labour, the cervix is usually 2–3 centimetres open, or dilated. It first needs to dilate to 10 centimetres, or full dilatation. Once fully dilated, the second stage commences and the mum-to-be can proceed with pushing out her little angel. So, in essence, the first stage is all about waiting for full cervical dilatation.

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We assess the degree of cervical dilatation by performing regular vaginal (or internal) examinations during labour, roughly four hours apart. At full dilatation no cervix can be felt by the gloved examiner, only the baby's head filling the pelvis.

The vaginal examination can also determine which way the baby is facing. Ideally, the unborn baby should be facing down towards the ground (or towards mum's back), that is, orientated so her mouth is closer to mum's anus, the eyes closer to mum's pubic bone (the top of her head gliding just under the bone). This is the 'occipital anterior' position, and it is optimal because this position naturally makes the baby flex (or bend) her neck and tuck her chin onto her chest. In fact, ideally the neck is so flexed that the leading edge of the baby coming through the birth canal is the top and back of her head, not the eyes. This creates the smallest possible head diameter to squeeze through the vaginal opening. It is possible to give birth vaginally if the baby is coming out in different positions, such as the 'occipital posterior position' (orientated so that the eyes are closer to the anus and the mouth closer to mum's pubic bone) but this usually a fair bit more involved.

You can imagine that women in the first stage of active labour need to deal with waves of painful contractions which roll on for many plodding hours. It can be pretty taxing stuff. The good news is that there will be a dedicated team that will take great care of her. Central to the team will be a caring midwife, a highly trained birth attendant. They will be a really comforting presence providing comfort, reassurance and 'on the spot' expertise as events unfold.

Also part of the team keeping mum and baby safe will be one of us, an obstetrician. To become a specialist obstetrician we first train as medical doctors, then face the rigours (some might say

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the horrors) of four to six years of specialist obstetrics training so that we can call ourselves experts in the care of pregnant women. We work shoulder to shoulder with midwives as an integrated team. The obstetrician provides overall supervision, takes overall responsibility and is on tap to render assistance for labours that aren't travelling smoothly. We are the ones trained to perform caesarean sections ('caesars'), forceps or vacuums if they are needed and we take charge if complications surface. But we are not just there for the difficult stuff. We also enjoy being involved in normal vaginal births.

Sometimes, the doctor is a highly skilled general practitioner (or a primary care physician) who has a special interest in caring for women while they birth. Depending on their level of training they may also have the skills to perform vacuums or caesars should they be needed.

We mustn't forget that spouses or birth partners form a vital part of the support crew. They play a crucial role providing a bedrock of emotional support. If you are one, you will probably find the person you are supporting will not be in the mood for small talk during labour: they just want the nurturing attention of their hand-picked support team. A well-timed hug can be of inestimable comfort. And if you are a support person bear in mind that while in the birth suite it's not the time to catch up on Facebook or emails. Not a furtive glance; not a quick Instagram post. Don't tweet updates. It really isn't a good look when we see the birth partner constantly distracted by their phone or distracted by anything. And we see it. I recall one support partner who stepped out of the birthing room, snuck off to the staff tearoom and rifled through the staff's belongings, pinching purses. Not cool.

Other things can be tried to set the mood. Fake candles with a soft, mesmerising flicker. Or real ones if the birth suite permits them. Dimmed lights. And music – Kenny G and Enya once dominated the aural ambience of birth suites during the late 1990s but are now (mercifully) replaced by all manner of music styles streamed via Spotify. Hard rock is actually not all that infrequent. But many labouring women do not bother with such frills and do just fine.

### Options for pain relief

There are different things labouring women can try out to cope with the pains that occur with contractions; plenty of courses, books and blogs teach meditative techniques (body-mind-uterus), many with a focus on breathing. Women can pace about, stand and sway, lightly bounce on a large sturdy birth ball; some are content to simply lie in bed, semi-upright or even lying on their backs (though with a slight tilt to the left, made possible by strategically positioned pillows). Some find a soak in the bath or the trickle of a warm shower soothing (as we shall find out later, there is some science to this). A shoulder massage can be useful, but it only seems to work if willingly offered by the tender hands of a loving partner. Heat packs across the lower back can also provide relief.

There are a quite a few other pain relief options. Women can breathe in nitrous oxide during the contraction, colloquially known as ‘laughing gas’. Another alternative is a ‘TENS’ machine, the short form of the rather ostentatious ‘Trans-cutaneous electrical nerve stimulation’. At the push of a button the TENS machine relays electrical pulses to small pads dotted along the

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lower back. The TENS machine triggers the sensation of touch which jostle for the brain's attention, competing with electrical impulses from the uterus propagating the sensation of pain. The net effect is that the signal from the TENS machine may help dull the pain. Other things that can be tried include aromatherapy, acupuncture (by prior arrangement with an acupuncturist) and water injections into the back. The biological basis underpinning some of these approaches is a little controversial, but they are all very safe. And if a labouring woman finds any to be helpful then I enthusiastically approve of them.

A stronger pain relief option is an injection of an opiate drug, such as morphine (some units may use pethidine). These can decrease the intensity of the pain for a few hours. However, opiates can make you spewy, so we commonly administer anti-vomiting medications at the same time. The slight concern with opiate injections is that if birth happens within two to three hours after the injection, bubby might emerge a little dozy and require a little breathing support from a paediatric team soon after birth until the effects wear off. But if it happens, it's usually short lived and harmless.

The options mentioned so far can take the edge off the pain but fall short of removing the pain. However, they may be sufficient for many, especially those who are blessed with speedy births. The only way to completely remove the pain is to have an epidural. When running well it is dramatically effective.

The epidural is a very fine tube introduced via a needle into the lower back. And I mean really fine, just a millimetre in thickness. The introducer needle is removed after the epidural catheter (aka the super thin tube) is in place, and only the tube is left in the

back. When slotted in, there is no big filthy needle left dangling out of the back.

One end of the epidural catheter rests delicately in one of the spaces within the lower back near the spine (but well clear from the important knot of nerves that form the spinal cord itself). The other end of the tube emerges through a microscopic hole in the back, runs up along the skin of the back towards the shoulder and ends attached to a drug infusion pump suspended in mid-air on a pole beside the bed. This allows the continuous infusion of precise doses of local anaesthetic agents that drip into the back, blocking nerves that sense pain from the uterus.

Often, the pain reducing medications dripped through the epidural catheter cannot be finessed to selectively block pain fibres alone; they can also affect the nerves controlling leg movement. This means women with epidurals running generally cannot reliably stand and may need to lounge in bed until they birth their baby. Also, those with an epidural cannot feel when they need to pee so a urinary catheter is slotted in via the urethra (the wee hole) to keep the bladder empty. Otherwise, the bladder could fill up and become overly stretched and damaged.

Within hours of birth the epidural catheter is whipped out, leg control will quickly return, and a welcome shower can soon follow.

### **Epidurals have a bad rep**

For some reason, a glaring spotlight is firmly fixed on the epidural as a focal point of political exchange, heated discussion and resolute social opinion that is broadcast freely (and loudly) whether solicited or not. Friends may enquire with unabashed

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directness, 'Are you going to try without an epidural?' I recently heard a complete stranger ask a new mother, 'Did you *need* an epidural?' A frenemy may announce with pride that they toughed it out without one, which can seem like a subtle challenge to expectant mums within earshot. To add to the quagmire, some vocal 'experts' resolutely declare that the epidural is the very invention of the devil; a weapon of disempowerment that triggers a 'cascade of interventions', thrusting the hapless victim into a treacherous, swirling whirlpool of increasingly dangerous and wholly avoidable medical procedures (as I will discuss in the next chapter, this is untrue).

I think it is a terrible shame that the epidural has become so politicised. It is just one pain relief option, no more, no less (albeit a very effective one). It is very safe and has legions of satisfied customers but also carries some small risks. Some will opt for it and others won't.

I am a fan of the epidural simply because it is just so effective at taking the pain away. Even though I have loitered about in various birth suites across two decades (hey, I am not that ancient) I still hate seeing people languishing in pain who do not wish to be, looking terribly despondent and deflated. In such cases the epidural can not only dispatch with the pain but boost the mood. This isn't to say for a minute that everyone should have one. In the next chapter, I dig deeper into the pros and cons of an epidural. For now, suffice it to say that the decision whether to have one surely rests with the labouring woman. Her choice should not merely be 'accepted' but be unjudged, and enthusiastically supported. Her decision-making should not be burdened by what others might think of it, and of them.

By now I hope you have acquired a flavour of the first stage of labour: roughly how long it lasts, how we determine progress (by performing regular vaginal examinations), and pain relief options. And I hope you are reassured that there will be the comforting presence of a skilled midwife constantly by the side of someone who is labouring, and that mum may also be cared for by skilled obstetricians (or general practitioners). With some imagination you may even manage to conjure up an image of the scene in the birth suite. But before we arrive at the second stage of labour, let's turn to the other important player who is deeply invested in the big day going right, though they aren't aware of it at the time (in fact, they are aware of very little of anything): the unborn baby.

### **Keeping the baby safe during labour**

You may have heard that the clinical team closely monitors the baby's heart rate during labour and wondered why. The reason is that labour can be a risky time for unborn babies and monitoring the fetal heart rate patterns points us to those in strife because they aren't getting the oxygen they need.

With their lungs lying dormant before birth, unborn babies depend on their placentas as their sole source of oxygen. The placenta itself receives a constant flow of fresh oxygen from mum's blood vessels and these reach the placenta after weaving through a lattice of muscle that forms the wall of the uterus. When the uterus squeezes into a tight ball during contractions the maternal blood vessels running within are squished. Happily, the baby gets to breathe between contractions because the uterine muscles relax, and the squeeze on the blood vessels ease. However, the net effect

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is that as labour progresses the total amount of oxygen delivered from mother to unborn baby reduces as the hours tick by.

During labour it's a bit like the baby is running a marathon. It's a test of endurance. Most cope just fine and are only a little puffed by the end of the race. A small number may have struggled throughout the run and reach the finish line profoundly exhausted. They may stagger through the red ribbon at the finish line (in this analogy, this is birth itself) and collapse into the attentive arms of first aid officers on standby (aka the paediatric team attending birth, which I talk more about later). Although bone-weary, these babies will be just fine because their marathon is at an end. With the race finished they can rest and suck in all the oxygen they need. Importantly, they have reached the care of the first aid officers who have a range of options to revive them back to health.

But a yet smaller number may fail entirely to cope with the run midway. They simply cannot summon the energy to reach the finishing line. The situation is more grave for unborn babies who do not have the option to simply stop running; they find themselves trapped in a hostile environment of stiflingly low oxygen well before full cervical dilation. And still a long distance from being safely born. Without access to a speedy caesarean section some babies in this hapless quandary won't make it out of the uterus alive. Others might just escape alive but tumble out silent with a thready pulse, and manage to just survive with a prolonged period of intensive resuscitation efforts. But this is not a flash way to begin life – such babies have a risk of being permanently scarred with serious disability from brain tissue damage caused by an overly long period of very low oxygen while stuck in the womb.

How do we clinicians sift out the few babies in peril that need us to intervene with a lifesaving caesarean section among the many others coping just fine with labour? If there was some form of technology that could accurately tell us the precise, minute-by-minute oxygen levels in the unborn fetus during labour we'd use it. But we don't.

However, researchers some six decades ago discovered specific heart rate patterns that appear in unborn babies who are suffocating from low oxygen levels. This led to the rapid clinical adoption of fetal heart rate monitoring, called the 'cardiotocograph' (known widely as the 'CTG'). The CTG monitors fetal heart rate patterns continuously, sort of like an electrocardiogram (or ECG) of the baby (though it's not quite the same thing). The appearance of specific fetal heart rate patterns can raise suspicions there may be dangerous fetal distress caused by low oxygenation. Seeing these will prompt the clinical team to have a careful think about whether it is necessary to fast-track birth to keep baby safe. Occasionally we need to act super swiftly if really ominous fetal heart rate patterns appear.

During the first stage of labour (where the cervix has not reached full dilatation) the only way to expedite birth is by caesarean section. In the second stage, the choices to expedite birth are a caesar or an instrumental birth, which will either be a forceps or vacuum birth. The choice between a caesar or an instrumental birth is made depending on how low the baby has descended down the birth canal and the direction it's facing. Caesars, forceps and vacuums will be touched on later in this chapter, then covered in quite some detail towards the end of this (riveting) book.

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Hence, the last jigsaw piece you may wish to add to the imagery of the birth suite in your mind's eye is that we will be monitoring the fetal heart rate. If the pregnancy is considered low risk then the midwife will intermittently use the hand-held Doppler device to listen to the fetal heart – the same device used at antenatal visits (the portable machine which makes the fetal heartbeat sound like a horse gallop). If there were any underlying concerns with the pregnancy or the hand-held Doppler device raises suspicion that a concerning heart rate pattern may be present, then we switch over to the CTG to continuously monitor fetal heart rate patterns. Unlike the hand-held Doppler, the CTG provides a constant readout and conveys more detailed information. Once the CTG is applied, the baby's heart rate patterns are monitored through labour, right up until bub is safely born and clear of harm's way.

### **The second stage of labour**

After many uncomfortable hours and resolute determination on the part of the brave mum-to-be, the midwife or obstetrician performs a vaginal examination and declares the cervix to be fully dilated. Yippee. We have arrived at the second stage.

The second stage lasts roughly one to two hours. Like the first stage, timelines can vary wildly. It can be mercifully short, especially for second-time mums, and even a matter of minutes for those who have had many vaginal births before. But for some unlucky ones, it can drag on beyond two hours. We do not really like the second stage stretching beyond three hours as the risks to baby (and even to mum) starts to lift.

Like the first stage, the second is divided into 'passive' and 'active' stages. The passive stage is an arbitrary period of time

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when we encourage women not to push. This is to allow the baby to descend down the birth canal as low as possible under the steam of further uterine contractions before we ask mum to exert herself. The active stage begins when the ‘almost mum’ starts her almighty pushes. The purpose of the passive stage – waiting for a while before pushing – is to move the starting line closer to the finish, so as to shorten the length of the run (aka the length of time that is spent pushing, or the ‘active’ second stage).

During the active stage women are encouraged to push during uterine contractions and rest during the minute or so between them. Pushing is a pretty strenuous workout and should be focused on the same spot to ease out a poo, but with far greater explosive force than what is typically required for number twos (unless there is zero fibre intake). A common technique is to fill the lungs by a little more than half before a sustained push – as hard as possible – that lasts for an effortful 10–15 seconds. A push with as much strength that the mum-to-be can possibly muster. We are talking beetroot red face, determined grimace, strands of saliva dancing about tensed lips, taut neck veins. A burger with the lot.

No air should escape from the mouth during a push as it wastes precious energy. At the end of each push the mum should snatch her breath as quickly as possible – a super speedy exhale and inhale – then immediately commence the next sustained push. All up, for every minute-long uterine contraction there should optimally be a set of three (or four) consecutive pushes where each lasts for about 10–15 seconds, with only the briefest microsecond snatch of breath between them.

The mum-to-be should make full use of the respite between contractions and catch her breath (literally and emotionally)

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because the next contraction will descend again upon her in a minute or two's time and the next cycle of pushing begins.

Women will often push lying semi upright in bed, but they can push in different positions. They most certainly do not need to be in bed. They can stand, squat or be positioned on 'all fours', with knees and arms on the ground and back in the air (just how we'd imitate a cat to our young kids when clowning about at home, though earnest pushing replaces pretend meow'ing). The experienced midwife can work with the mum to try out different positions.

During all this pushing the support crew around the mum should be her devoted cheer squad, providing moral support that is steadfast and unwavering. Pushing can continue for even an hour or two and lifting the spirits with constant encouragement is supremely important.

Once the baby's head has finally edged down to the opening of the vagina things usually progress a little quicker. The point at which the baby's head is tenting open the vaginal opening and can be directly seen is called 'crowning'. Once this happens birth is tantalisingly close. If an epidural is not on board, this stretch of the vaginal opening causes an unpleasant feeling of intense burning on mum's skin. Happily, the duration is mercifully short: crowning usually lasts around 10–15 minutes and once the baby is out the scorching sensation dissipates.

When the head is born it usually pops out facing downwards toward the floor (mouth closer to mum's anus and eyes closer to her pubic bone). At this point the body is not yet born, it's just the head poking out. The midwife or obstetrician will gently insert a gloved finger to check whether the umbilical cord is

looped around the neck of the baby. If so, it's gently loosened and eased out. The head then swivels 90 degrees and the baby ends up facing sideways towards one of mum's thighs. On the next push the shoulders are born, closely followed by the body and legs which all slip out in one smooth slide.

The second stage of labour is an event long remembered by women who have experienced it, as well as her chosen support crew. Although exhausting, it has the satisfying finale of a crying adorable bundle – a warm, wet, slippery new addition to the family plonked onto mum's tummy and into her longing embrace. A cuddle that had been dreamed about for months, possibly years.

### **The third – and final – stage of labour**

Happy times. Baby is out. The horrid painful contractions have shuddered to a halt (good riddance). The terrible burning at the vaginal opening has already started to settle (good riddance to that too). The first strands of an enduring unconditional bond of love between mother and baby are already fast forming. The relieved partner, also exhausted, is darting about the bed, creating happy snaps to capture the precious moment. Gazing at the cooing newborn's face, the parents are already muttering through a shortlist of names to see which best matches junior. And we are in that beautiful zone of pre-social media innocence, an all too brief moment of untainted purity where the birth has still yet to become 'Facebook official'.

However, a few tidying-up things need attending to before the process of childbirth is at an end.

First, we need to deliver the placenta. It usually follows within 10–15 minutes after the baby; however, occasionally

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it'll be longer. A big, sustained uterine contraction following birth itself shears the placenta off the wall of the uterus where it had been embedded for months. Though detached and floating free, it will still be sitting inside the womb. To coax it out, the midwife or obstetrician places a hand across mum's lower abdomen (to feel where the uterus is) and gently pulls on the umbilical cord with the other hand. Mum doesn't need to push. In fact, often mum hardly notices this is all happening until the placenta plops out.

Occasionally, we encounter a stubborn placenta that refuses to let go of the uterus well after the baby has arrived. A procedure, called a manual removal of placenta, is needed to remove such a nuisance house guest overstaying its welcome. Annoyingly, it is a short trip to theatre where the obstetrician dons a long glove, reaches in via the birth canal into the womb and dislodges the placenta by hand (like a weird version of a forced eviction, I suppose). Sounds yuck but it is a minor procedure that is quick, safe and done under the cover of adequate pain relief so it won't be felt. But it is a bit of a bummer to do as we would all much rather leave the new family in peace. Instead, we need to whisk mum away for a quick visit to the operating suite before returning her back to her prized newborn.

Secondly, concerningly heavy bleeding from the vagina can happen soon after the birth, called a 'postpartum haemorrhage'. We expect some bleeding after all births where anything less than an estimated loss of half a litre is considered acceptable. This sounds like an alarming quantity and I agree you wouldn't want this volume of blood pouring out of a freshly picked nose or

scratched pimple. Or from your haemorrhoids. But in the setting of childbirth this is the expected amount and new mothers can tolerate such losses just fine.

If we are concerned that the bleeding is unusually brisk and we estimate that losses are totalling over half a litre we take active measures to stem the flow. The most common source of bleeding is from the inner wall of the uterus itself, from the raw surface where the placenta has freshly detached. Blood trickles from this open surface through the birth canal and out the vagina. To deal with this we rapidly administer drugs to contract the uterus really tightly, and to stay contracted. By squishing the uterus into a very tight ball the blood vessels coursing through it are also squished shut, and this arrests most bleeding. The drugs we give are usually highly effective and stop most cases of haemorrhaging. In fact, they are unsung heroes and over the recent decades have saved an enormous number of lives.

On occasion these medications fail to stop the bleeding and there is a persistent trickle. If we become concerned that the losses are mounting north of a litre and the bleeding still isn't showing signs of abating, we may need to take the new mum to the operating room so we can try other things to stop the flow (we will cover these later in the book). Luckily, this is very uncommon but utterly annoying when it happens.

Lastly, tearing can happen, caused while bub is squeezing through the vaginal opening. And sometimes, while the head is crowning the midwife or obstetrician will make a small cut at the vaginal opening angled sideways, called an episiotomy. The aim of doing this is to decrease the chance of uncontrolled tears appearing that extend towards the anus and damage the

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anal sphincter, the important ring of muscle that allows us to control our bowels. The episiotomy tries to direct any tearing away from the anus. Episiotomies are commonly done in the United Kingdom, Europe, Australia and many other regions in the world, but far less so in the United States.

Tearing and episiotomies are common, particularly for first-time mothers, and are expertly mended using stitches (that self-dissolve) very soon after the birth by either the obstetrician, midwife or general practitioner. Happily, the region around the vaginal opening has a plentiful blood supply which endows it the nifty skill of being exceptionally good at healing. It is perhaps similar to our spongy fingertips: being plump with blood, they usually heal exceptionally well without scarring after minor kitchen knife mishaps (even though at the time of the flesh wound they bleed like stink and hurt like heck). Also, most tearing or episiotomies are small and easily repaired with excellent prospects that healing will be quick.

### **Plan B: caesarean sections, forceps and vacuum (or ventouse) births**

If all births progressed smoothly than caesars and forceps would not exist. They simply wouldn't be needed. But the labour does not always follow the elegant path laid out by nature.

There are two main reasons why we turn to caesarean sections or instrumental births (forceps or the vacuum) to expedite birth. The first, which we touched on before, is fetal distress, which is when we have suspicions that the baby may be flagging from stifflingly low oxygen levels, gleaned from concerning fetal heart rate patterns appearing on the CTG machine. Things are different

after birth: once out, the baby switches to her own lungs to draw breath, removing the perils faced while in the womb.

The second reason we may recommend a caesar or an instrumental birth to deliver the baby is because there has been arrested progress of labour (sometimes called ‘failure to progress’). This is where descent of the baby through the birth canal has stalled. It declares itself during the first stage by the fact that the cervix has stopped dilating, where vaginal examinations spaced many hours apart reveal an infuriating lack of progress. Arrested progress of labour can also happen during the second stage after the cervix has reached full dilatation, where the baby fails to emerge after a long, gallant period of pushing (just ask poor Alice in vignette 2 from the Introduction).

A caesarean section is an operation where we deliver the baby through an abdominal incision, bypassing the vagina entirely: ‘The sunroof exit’ – more on this in Chapter 8. We make a sideways incision low down on the abdomen, approximately level to the upper border of the bikini line (when fully healed, the skin scar often sits below the upper margin of underwear and hidden from view). We then make a horizontal incision on the uterus and deliver the baby through this incision, and out the hole in the abdominal wall. We then sew up all the layers we opened to reach the baby, one by one. Quite a conceptually simple operation really. With good pain management the recovery can be quite quick; mum will feel pretty comfortable the moment she is wheeled out of the operating theatre, be able to move about on the day of the procedure, be happy to head home after a few nights, and be free of all pain relief medications within two or three weeks of the operation.

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Forceps can only be deployed in the second stage and are used by obstetricians to help pull out the baby. They look like large salad servers that wrap around and grasp the baby's head.

The two 'blades' of the forceps are eased through the vaginal opening and gently slid around the unborn baby's head, one at a time. When applied, the rounded 'spoon' of the forceps blades hug the baby's cheeks. From the top of baby's head, the other end of the forceps extend out through the vaginal opening and end as handles that the obstetrician grips. Once the two blades of the forceps are safely placed around the baby's head, they neatly join together. With the onset of a contraction the obstetrician assists birth by pulling on the forceps handles. Once we start tugging on the forceps the baby will usually be birthed within three sets of contractions. The idea of forceps may be a tad intimidating; however, they are cleverly designed to wrap snugly around the baby's head and centuries of use are testament to its safety.

A vacuum or ventouse birth is similar in concept to the forceps – it's just another way to pull out baby. However, it is a suction cup placed on the baby's head rather than an instrument that wraps around it. The ventouse is shaped somewhat like a sink plunger, or that intimidating stick thingy poking out of evil metallic Daleks (that's for the *Dr Who* fans who have never once cleared a sink blockage before). Except that the suction 'cup' at the end is not as big and is shaped more like a thick round disc about 5–7 centimetres across.

Thin tubing attached to the top of the suction cup runs from the baby's head, through the vaginal opening to a handle with a pump. This hand pump creates a negative pressure inside the cup which provides direct suction on the baby's head (similar in

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concept to those 1980s TV adverts where a moustache-endowed salesman in a tacky brown suit uses a vacuum cleaner to suck a bowling ball clean in the air to demonstrate its raw power). Like the forceps, the obstetrician pulls on the handle during contractions, and it can only be used during the second stage. Once we have started tugging on the ventouse, birth should be anticipated within three sets of contractions.

Sometimes during labour, the CTG suddenly throws up such alarming fetal heart rate patterns that we are forced to act quickly to remove the baby from serious harm. When this situation arises the window of time to provide information and obtain consent to proceed to a caesar or instrumental birth can be brief.

I hope this has been a useful taste of the different medical interventions; in Chapters 7 and 8, I spend quite some time exploring them in more detail – to really demystify them. So, if they are needed with haste for the birth you are involved in, knowing them well and ahead of time will make the experience far less scary.



There you have it – a bird's eye view of childbirth. I suspect after reading this chapter you will already know a great deal more than many others who step into the birth suite. I am also sort of hoping this chapter has proved surprisingly fascinating to you. And has whet your appetite to discover more (yes, I am just like the many other deluded authors who think their book is interesting).

And there is so much more to discover.

## CHAPTER 1

In the next chapter, I will launch into pain relief options. By the end of it you will have acquired a really sound understanding of the many options to counter the pain of labour. Following that, we will take a closer look at the astonishing event that is human labour and childbirth, and what we do if the ship sails off course.

So please stick with me.

## Recap: **Overview of birth**

1. Spontaneous labour becomes more and more likely to kick in as pregnancies edge closer to the expected date of birth, or 40 weeks gestation. Some perfectly healthy pregnancies overshoot the 'expected date of birth' by one or two weeks.
2. Labour is divided into three stages. The first stage can last six to eight hours, it begins when strong contractions set in, and ends when the cervix is fully dilated. The second stage lasts around one to two hours and is when the mum does her almighty pushing. It concludes when the little munchkin is birthed (preferably one that's adorable). The third stage ends when the placenta slides out and is typically over within 15 minutes.
3. Labouring women in the birth suite will be cared for by a highly skilled midwife. Doctors are also an important part of the team. During labour women can take on any position they like; they can eat and play with the ambience of the room (BYO music, aromatherapy, dim the lights, pretend candles, lava lamps).
4. During the first and second stages of labour there are frequent uterine contractions. Unfortunately, they are pretty painful. And intense. Happily, there are a range of options to counter the pain – ranging from non-pharmacological (breathing techniques, TENS machine), inhaling nitric oxide to opioid injections (mainly morphine). An epidural

## CHAPTER 1

is the most effective option that is dramatically effective in removing the pain altogether.

5. There are two main reasons why we recommend an instrumental birth (forceps or ventouse, widely known as ‘the vacuum’) or a caesarean section. The first is fetal distress – the unborn baby may be in peril because it’s not getting the oxygen it needs (we glean the presence of fetal distress by monitoring fetal heart rate patterns). The second reason we recommend an instrumental birth, or a caesarean section is arrested labour (or ‘failure to progress’), where the cervix stops dilating during labour or the baby stops descending down the birth canal during the second stage.
6. If we do need to expedite birth, the only option during the first stage of labour is a caesarean section. For those who have reached the second stage of labour, we will either recommend an instrumental birth (if the baby’s head is low enough and it’s judged safe to attempt one) or a caesarean section.

Caesareans and instrumental births are very safe, although there are some risks. In coming chapters of this book, I cover caesareans, ventouses and forceps in quite a bit of detail.

## Chapter 2

# A closer look at pain relief options during labour

Some years back the mathematical genius Jordon Ellenberg came up with the Hawking Index. It (roughly) estimates how often books are read to the very end and is calculated from digital data generated from the millions consuming eBooks on their Kindle devices. It is a disconcerting thought that your ebook reading habits are being hoovered from your password-protected device and freely accessed by numerically gifted strangers in distant lands. Or perhaps in this era no-one cares.

The index is named in honour of the great physicist Stephen Hawking who wrote the mighty *A Brief History of Time*. The name is inspired by the fact that of all the ebook sales of the classic penned by Hawking, only 6.6 per cent were actually read cover to cover (what the index cannot tell us is how many of the 6.6 per cent understood it, which I suspect is not many). I am not surprised. The front pages of my own copy were attacked with inspired enthusiasm, but the latter half remains in mint condition to this day.

Even if you turn to easier reads, the number of books that have engaged the reader to the very end remain surprisingly low. *Catching Fire*, the second *Hunger Games* novel, apparently scores 43.4 per cent. And after the embarrassment of purchasing

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*Fifty Shades of Grey* – albeit online and therefore ‘anonymous’ – only 25.6 per cent got through all 50 shades. Overall, it is very uncommon for books to crack a score over 50 per cent.

Non-fiction books fare far worse. It was a surprise to me that *How to Win Friends and Influence People* scores a paltry 7.7 per cent (presumably those who bought this timeless self-help classic later decided finding friends wasn’t so important after all). Hilary Clinton’s memoir, *Hard Choices*, scores a preposterously low 1.9 per cent (any future edition might be more correctly titled *Hard Slog*). You need to search far and wide to find a non-fiction book with a Hawking Index that scores above 20 per cent. I note these truths with some alarm, as *The Birth Book* is also non-fiction.

Thus, the Hawking Index is the unlikely reason why I have prioritised a chapter on pain relief early in the book, before our deep dive into labour. Of course, I would love every one of you devoted readers to consume every morsel of my obvious ‘page turner’ to the very end (perhaps lingering affectionately on the unique barcode that adorns the back cover), but the Hawking Index tells me that despite my elegant prose and self-declared alluring style some may not make it to the end (boo). Therefore, I have chosen to position the chapter on pain relief early on because I reckon it is one of the most important things that women approaching labour should know well. So important that I have slotted it in the book as early as Chapter 2 in the hope that it lands in your pile marked ‘Read’.

The reason why knowing pain relief options well is so vital is that pain relief is the one area where women stepping into the birth suite will have a lot of choice. In fact, they will be asked to actively make choices – to select some pain relief options and

consciously decline others. And I am worried that too often, these major decisions are based on no information, incomplete information or even misinformation. My suspicions are backed up by Australian research published in 2007 in the journal *Midwifery*, which concluded pregnant women's understanding of pain relief options are often based on anecdotal information. This is perhaps no surprise to those of us at the front line in the birth suite.

So here they are – the various options to counter pain during labour. I do trust that as you consume this chapter you will tuck away useful facts to draw upon on the big day.

### **Drug-free strategies**

Presumably after some heated exchanges among a panel of esteemed global experts the International Association for the Study of Pain (IASP) pronounced this official definition of pain (as it stood in 2019): 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage'. Okay...

It's an undoubtedly comprehensive definition, but it's a wee bit dry. And although noble in its attempt to cover every conceivable type of pain the earnest panel could think of (and I am sure there were many), this final definition seems rather expansive. According to this definition, just vividly imagining the unpleasant emotional experience of a crazed brown bear ravenously gnawing chunks off one's rapidly diminishing thigh might arguably be defined as pain. And I am also pretty sure this official wording wouldn't be the same verbatim definition if you asked mums to define the pain they experienced during labour. Theirs would likely be shorter and contain risqué words such as

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'hurt' (conspicuously absent in the official definition). It might even include a sprinkling of four-letter words that would make illustrious senior committee members of the IASP blush.

Before I get into strife with my professorial academic colleagues, I wish to highlight an important aspect of this official definition of pain espoused by the IASP. Pain is not just sensory, but also an emotional experience. This, I do agree with and is worth bearing in mind when women consider their options for pain relief during labour. Women vary widely in their emotional response to active labour. And it is certainly not the case that those who appear to cope less well are somehow less tough. Not at all. It is simply that humans react in their own personal way to pain, perhaps further influenced by their cultural background and life experiences. For instance, someone who appears to be coping poorly with the pains of early labour may have been anxious for weeks leading up to the event, perhaps frightened by stories told by those around them. This constant anxiety could easily have emotionally sensitised them to react strongly once the pains of active labour finally set in.

Countering the emotional response is a likely explanation why many non-drug (or non-pharmacological) options greatly assist many women to cope with the pain of labour. This is a good thing, as the ultimate goal of pain relief during labour is not so much to minimise the 'unpleasant' sensory pain experience' (in non-IASP sanctioned terms, how much it hurts) but to improve the overall emotional experience of childbirth.

Therefore, the presence of hand-selected people in the room – partners, friends and family – is an important way to combat adverse emotional responses to pain during labour. The value

of familiar voices uttering soothing messages of encouragement cannot be underestimated. Another strategy is to alter the ambience of the room: candles (even pretend ones), familiar music streamed from a portable speaker or a preselected fragrance wafting from an aromatherapy diffuser to sweeten the aroma of the room. And for some lucky women destined for a rapid labour, such as Alice in the first vignette from the Introduction, such comforting measures may be all that's needed.

Some women opt to invite a doula, a professional support person. Women get to know their doulas ahead of time and they will be a familiar face whose role is not to manage labour but offer emotional support. Many are midwifery trained.

Similarly, some women choose a model of private obstetrics care (not all countries offer this). Over the many months of pregnancy, the expectant mother gets to know, bond with and trust the person pegged to assist their birth and this can provide great emotional reassurance during birth. Exactly the same applies to inviting a private midwife (or general practitioner) to provide expert care during pregnancy, and to attend the birth.

Other measures to cope with the pain of contractions are to employ techniques that focus on breathing. Whether they work by distraction, are meditative, or both, I am unsure. But some women find these useful and indeed, I have witnessed many women who manage to enter 'the zone' during the trying hours of labour, breathe through each contraction with full focus and serene determination, and get through a fulfilling birth without medications. For those who are interested there are antenatal courses, such as 'calm birthing' or 'hypnobirthing'.

### **Gate control theory, TENS machines, water injections and acupuncture**

In 1965, Ronald Melzack, a Canadian psychologist, and Patrick Wall, an eminent British neuroscientist, proposed the Gate Control Theory of Pain. The concept is pretty simple. Nerve fibres transmitting the sensation of touch from the skin to the brain are separate to thinner ones that relay the (annoying) feeling of pain. The theory holds that both types of nerve fibres jostle to get their respective messages through the same ‘transmission cells’ that sit around the spinal cord (the transmission cells then relay the message up the spinal cord to the brain). In essence, the nerves that relay the feeling of touch and pain share the same ‘gate’.

If only one nerve type is firing, say the pain fibres, then a message of pain is efficiently relayed via the transmission cells (aka the ‘gate’) to the brain. And we feel it. But if there is also simultaneous firing of the nerve fibres transmitting a message conveying touch, it will block or decrease the strength of the signal transmitting pain because they can’t both efficiently pass through the ‘gate’ (transmission cells) at the same time.

Gate Control Theory can be intentionally exploited by stimulating touch fibres on the skin to block or at least reduce the strength of the signal conveying pain. One common way we all instinctively use Gate Control Theory to manage the ‘unpleasant sensory experience’ caused by a bee sting is to give the fresh bite a rub on the skin to dull the sharp pain. (The other way we deal with the ‘unpleasant emotional experience’ is to murder the pollinating aggressor with unhinged brute force).

Gate Control Theory is probably at play for some of the common drug-free strategies to counter the pain of labour, such as

bouncing on a birth ball (where the sensation of touch around the pelvis counters the pain), massage, a shower or bath, or heat packs.

The 'transcutaneous electrical nerve stimulation' (TENS) machine was designed to exploit Gate Control Theory of pain. Four pads housing tiny electrodes are stuck along the lower back. Wires from these pads lead to a machine that pulses electrical signals to stimulate the nerve fibres conveying light touch. The electrical signals can be switched on by a button held by labouring women and pressed with the onset of contractions.

Sadly, clinical trials assessing whether the TENS machine is indeed effective to counter the pain of labour have thrown up inconclusive results. I've seen it used for many years, and my view is that it can be really helpful at home during the passive phase of labour but is not so flash at countering the full-on pains of active labour. But it is super safe and may be well worth a shot. Women who want one for their upcoming labour will usually need to hire or borrow one in advance. (Unless they intend on purchasing a machine outright. This I do not recommend because it probably won't ever be touched again. After being rolled out for the big day it will probably sit idle in the garage indefinitely, a tangle of electric cords stuffed in the same cardboard box as a crumpled wedding dress housing a content family of hairy arachnids.)

Gate Control Theory may also explain why some women find relief from sterile water injections. During labour, minute amounts of water are injected under the skin around the lower back, forming small blebs. It can be repeated as many times as labouring women request.

Acupuncture is another option. It's not based on Gate Control Theory and doesn't sit within the realms of Western medicine.

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The concept is that fine needles are slotted into meridian lines by skilled practitioners. They influence ‘qi’ or life energy forces. Whether this is really a thing, I don’t know. However, if labouring women wish to try acupuncture and it works for them, I am genuinely delighted.

Doulas, candles, music, TENS, water injections. You can see there are many non-drug options and for many women these can work wonders to counter the emotional response to pain and can make the birth experience a happier one. For many these will be enough, especially those blessed with rapid labours.

However, as for sensing the intensity of pain it is probably a fair call to say all these non-drug strategies only take the edge off the pain, at best. For many labouring women, none of these options substantially dull the strong pains that come with active labour.

### **Drug (or pharmacological) options**

In 1847, the anaesthetic power of chloroform was discovered by the Edinburgh physician James Young Simpson, who also happened to be an obstetrician. Around that time, he and his two adventurous assistants (James Matthew Duncan and George Skene Keith) had a somewhat fringe hobby they indulged in during evenings of personally inhaling experimental chemicals. In Simpson’s dining room. Their hope was to find one with an anaesthetising effect that was preferably not fatal.

It is unclear whether their self-experimentation was done before dinner or after. If after, they were breathing in mysterious chemicals on a full stomach – something we now know to be very dangerous for anyone who is anaesthetised (if any of them vomited while unconscious they would have inhaled half-digested

haggis into their lungs, which would efficiently kill them). And I trust these poisonous experimental chemicals weren't carelessly left unlabelled on the extensive spice rack of the Simpson kitchen.

On 4 November 1847, they tested a chemical called chloroform. It was selected on the flimsy basis that a Robert Glover reported just five years earlier that it could induce sleep in large animals. Never mind that it was widely considered unsafe for humans.

On inhaling the chloroform, they experienced a brief euphoric stage of a 'general mood of cheer and humour' before collectively passing out. It is puzzling why the three intrepid pioneers simultaneously inhaled something that could have wiped them all out. Wouldn't it have been more sensible for Simpson to nominate one of his obliging young assistants to test it out first? Happily, death wasn't to be their fate – the following morning they all regained consciousness.

The moment Simpson awoke he knew he was onto something. Ever the responsible uncle, he did the obvious thing: he rushed up to his young niece Miss Petrie and tried it on her. After inhaling the chloroform his niece dreamily announced, 'I am an angel!' Then passed out. Luckily, for the sake of ongoing sibling harmony among the Simpson family, James' beloved niece managed to wake up. This is just as well since the drug is, in fact, not completely safe as it can induce fatal heart rhythm disturbances. Robert Glover ultimately died of a chloroform overdose, an ironic twist of fate given it was probably he – not Simpson – who actually discovered the anaesthetic potential of the drug but never received the credit (and almost certainly, he became hooked on the euphoric properties of the very stuff he had discovered).

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News of the miraculous discovery spread quickly. In that same year of 1847 Queen Victoria, pregnant with her sixth child, caught wind of it and was keen to give it a try. But the wise royal physicians cautioned her against it, so she endured labour without it. When she was pregnant once more in 1850 there was another robust parlay among the royal physicians. Again, they cautioned Queen Victoria that it was not safe to use chloroform. One progressive opinion offered by the obstetrician Professor Charles Meigs was that the painful contractions during labour were ‘natural and physiological forces that the Divinity has ordained us (i.e. women, not him) to enjoy or to suffer’. Nice one, Charlie.

However, by her eighth pregnancy in 1853 the tide of opinion had turned. The royal doctors had enough confidence in chloroform’s benefits that they agreed to offer it for the forthcoming labour. On Thursday 7 April 1853, Queen Victoria gave birth to Prince Leopold after inhaling chloroform for 53 minutes from a handkerchief. She pronounced it ‘delightful beyond measure’.

Some might tsk tsk the conservative attitude of the royal physicians who seemingly deprived the queen of a powerful analgesic agent for two births after its discovery. In contrast I am rather amazed that within six years, an experimental chemical (one with an uncertain safety profile) could progress from its first use in humans to being given to a monarch leading an empire that ruled over a quarter of the world’s population (some 450 million subjects). At any rate, chloroform heralded the era of pharmacological therapies to combat the pain of childbirth.

We don't use chloroform today because it is too dangerous (we aren't enthused about giving drugs that can seriously muck about with the rhythmic pumping of mum's heart). Instead, three pharmacological pain relief options are commonly offered in the birth suites of today: inhaled nitrous oxide (popularly known as laughing gas), opiates (such as morphine or pethidine), and epidurals. Of all these pain relief options the epidural is far and away the most effective in removing the sensation of pain during labour.

### Nitrous oxide

Nitrous oxide is a safe odourless gas sucked in through a mouthpiece or a mask held by labouring women. The gas used in the birth suite is a 50:50 mix of nitrous oxide and oxygen, and how it dulls pain remains unclear. It is a testament to human ingenuity that we have somehow discovered curiously different uses for the same molecule; not only have we figured out breathing it in can lessen the pain during childbirth and dental work but adding it to fuel adds a massive kick to the engine of high-performance cars (if you need solid proof, just watch *Fast & Furious*). It can even help propel rockets.

For maximum effect there needs to be a good amount of the stuff swirling about in the lungs, where some is absorbed into the bloodstream to reach the brain. Optimally, women start sucking deeply on the mouthpiece around 30 seconds before a contraction, but since the onset of the next contraction can be hard to anticipate most simply start inhaling once they feel the beginnings of the next contraction.

Nitrous oxide makes the person taking it a little disorientated and light-headed as if they are about to faint. Some report a sense of euphoria. Sadly, this most certainly doesn't happen for me – I

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have given nitrous a try (a rather unspeakable saga of a traumatic shoulder dislocation, self-inflicted while penning this chapter) and was disappointed to feel nothing remotely close to a high.

Once stopped, it wears off in seconds. It may cause nausea but labour itself can do that. Also, no-one can breathe in and push at the same time. This means it cannot be used during the second stage when it is time to push.

It is fair to say nitrous probably takes the edge off strong pain but doesn't take it away altogether. And for some, it has no discernible effect at all. When I sucked it in after my shoulder misadventure the nitrous only made me light-headed and spaced out. But for me it didn't touch the excruciating pain that I now appreciate arises when the bone of one's upper arm is wrenched clean out of the shoulder socket (life hack – don't run down the stairs to take your indoor dog out for a wee. Walk. Doggie can wait).

Still, it may be worth giving nitrous a shot. For those destined for a quick labour it may be an excellent option to tide labouring women over until the cervix is fully dilated and they are ready to push.

### **Opiates such as morphine**

A common option offered during labour is an injection of morphine (or pethidine). These are 'opiate drugs', the same addictive substance that enslaved millions in opium dens during the 19th century. Even today, millions continue to take the stuff recreationally. But don't worry: one or two injections during labour won't get you hooked.

Morphine is isolated from poppy plants whereas pethidine – also known by its technical name meperidine – is synthetically

produced. These drugs target the 'opioid' pain receptor on nerve cells sprinkled throughout the brain and spinal cord. They are injected into the muscle of the buttocks or thigh, and their effects last around three to seven hours.

Their advantages are that they can be given quickly and easily. They are usually more effective than nitrous but are still not great at substantially relieving the pains of active labour in full flight. However, they can do a decent job at blunting the severity of labour pain. A scientific paper that gathered all the evidence from many human clinical trials concluded: 'opioids provide some pain relief and moderate satisfaction' (these eight words succinctly sum up an impressively lengthy document chock full of pages upon pages of heavy-going scientific lingo).

However, they can make you sleepy and be relied on to cause nausea and vomiting. To counter this, anti-spew medications are often injected at the same time. These are usually ondansetron (widely known as Zofran) or maxalon; the same friends that have helped many women stagger through their brutally chunderous first trimesters.

Another downside is that they cross the placenta and can make newborns drowsy at birth, so that sometimes a little resuscitation is needed by the paediatric team to initiate breathing. Happily, this sleepiness is short-lived and disappears once the drugs wear off.

For babies born seriously dozy, the paediatric team can give a drug called naloxone to reverse the effects of opiates. Naloxone works well for morphine, but pethidine is broken down into products that hang around for a long time and are not readily reversed by naloxone. Also, pethidine has been linked to lingering effects in the newborn, such as changes in behaviour, more crying

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(like that's needed) and difficulties taking to the breast. For this reason, many birth suites have moved away from pethidine and now favour morphine, including my own hospital. The United States does not generally use pethidine at all. Perhaps it's time pethidine is retired and morphine is used exclusively.

In short, a morphine (or pethidine) injection may provide some pain relief, is easy to administer (though there is a quick ouchy needle for the recipient) but can cause puking and can make some babies temporarily snoozy at birth. Opiates may be a great choice for some, especially those whose labours are moving along rapidly where a shot of opiates may be all that's needed to tide them along to birth.

### **Epidural and spinal anaesthesia**

The epidural is the only option that decisively removes the pain of labour. It's dramatically effective. Women huffing and puffing before an epidural will often be comfortably seated in bed and soaking in a bit of television after one is put in. Pain free while still in labour – chatting, resting, catching up on sleep. Waiting for full cervical dilation so they can start the business of pushing.

The variation in the rates of epidural uptake across the globe is breathtaking. Seventy per cent of those labouring in the US will have one, but only 36 per cent in the United Kingdom. These are women with presumably similar access to epidurals if they asked for one with the only apparent difference being the land mass they happen to be perched on during labour. Either geographical differences impact on how strongly pain is felt (seriously unlikely) or the astounding difference in uptake is entirely dictated by culture and attitudes.

Many expectant women will have thought a lot about whether they want to have an epidural well before labour happens. And when challenged by the discomfort of active labour, many who initially erred against having one will re-evaluate their choice. What worries me is that I bet many make their choices with a tenuous grasp of the facts, perhaps coloured by a few myths, so I'll spend a fair bit of time exploring the epidural.

The spinal cord dangles down from the base of the brain, like string hanging down from a floating helium balloon (though the spinal cord is not centred but off to one side). It is a thicket of billions of nerves running down from the back of the brain, protected within a hard canal made up of the bony spine. Nerves then splay out of the spinal cord through small gaps studded down the length of the bony spine and these nerves spread out like electrical cabling to reach distant organs and the periphery of the body. The nerves relay information to and fro, between all parts of the body and the brain. Nerves faithfully send commands from brain to muscles so we move, and they bring back signals from the skin to the brain so we can sense.

The spinal cord is wrapped by a protective fibrous layering called the dura (dura mater). Within the encasing of the dura mater the spinal cord is bathed in cerebral spinal fluid, widely known as CSF. Okay, anatomy class is over and I hope you are still with me.

The epidural is an exceptionally thin tube inserted through the lower back into what's called the epidural space. This space is about 5 centimetres deep from the skin surface and just outside the protective coating of the dura. Right next to but not through the dura.

### *How an epidural is inserted*

The midwife or obstetrician will first perform a vaginal examination to make sure the baby isn't really close to being born. Because if it is, there literally may not be time to insert an epidural.

To put in the epidural the labouring woman will be positioned sitting on the bed or lying on her side, back exposed. They will be asked to curl forwards as much as possible, back arched towards the anaesthetist performing the procedure. In this awkward pose, women are then asked to stay still – not the easiest thing to do while being buffeted by waves of painful contractions. But it is important to try as this curled position opens up the tissue spaces in the back, making it easier for the anaesthetist to position the epidural as speedily as possible.

The back is painted with an antiseptic wash. It is usually pink and ice cold. The anaesthetist then numbs a spot on the lower back by injecting a bleb of local anaesthetic just under the skin – a quick sting. An epidural introducer needle is then put into the back through the numbed spot to locate the epidural space by feel. Once found, the tiny epidural tubing is threaded through the inside of the introducer needle and slid into the epidural space. The introducer needle is then whipped out and the epidural tubing left in.

Once in place the epidural catheter – or tubing – which starts in the epidural space in the back, emerges through a tiny hole in the lower back (where the introducer needle once entered), runs up the back towards the shoulder, securely taped on the skin. The tubing continues from the upper back to a machine

called a syringe driver. This is attached to a metal pole poking up from one side of the bed (such a pole is an essential prop to denote 'hospital bed' in any respectable Hollywood medical drama). The syringe driver releases very precise amounts of local anaesthetic into the epidural tubing which dribbles out of the other end into the epidural space within the back. This local anaesthetic then seeps into the major nerve endings supplying the uterus, birth canal and legs to provide powerful pain relief. Once in, the epidural is left to run until the baby is born.

Often, the epidural doesn't just block pain but also motor control of the legs. The motor block is usually not absolute, meaning women can still move but they will feel less control. This can make it hazardous to walk about, so those with an epidural may need to lounge in bed for the rest of labour.

A urinary catheter is inserted into the bladder, as women with an epidural will not be able to reliably sense when they need to urinate. Without one, their bladders could fill right up and become damaged by excessive stretch. Finally, for those with an epidural we will continuously monitor fetal heart rate patterns using a cardiotocograph (or CTG).

Within a few hours after the baby is birthed it's removed by simply sliding it out. Muscle control and full sensation promptly returns.

Many women are under the impression that to insert an epidural the anaesthetist needs to perilously dodge the spinal cord dangling just millimetres away from the end of the needle, where a few nervous tremors could result in catastrophic permanent paralysis. This is absolutely not the case. The spinal cord hanging

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down from the brain ends well above the spot where an epidural is placed. And well clear of the introducer needle.

If a decision is made to perform a caesarean section and an epidural is already in place the anaesthetist can conveniently 'top up' the epidural by squirting in more drugs through the epidural catheter. This 'top-up' takes effect within 10 minutes and provides a far more powerful level of pain (and motor) blockade than the epidural infusion so that a painless operation can be done.

If a caesar is needed but an epidural is not in place then a spinal anaesthetic is often done instead of an epidural. Unlike an epidural where tubing is left in, a spinal anaesthetic is a single shot injection of local anaesthetic agents. The other major difference is that the needle of the spinal anaesthetic pierces the dura mater and delivers the numbing drugs straight into the subarachnoid space where the nerves of the spinal cord are floating about in the cerebral spinal fluid (or CSF).

### **The pros and cons of an epidural**

The massive pro of an epidural is that if it's working well, the pain relief is absolute. As sensory pain removal goes nothing else comes close (except being knocked out). Another compelling pro is that if mum ends up needing a forceps or vacuum birth, having an epidural running will make these procedures far more comfortable. As just mentioned, having one in is convenient if a caesar is ultimately needed as we can simply squirt more drug into the epidural catheter and within minutes we can start the operation.

Of course, something this effective has some risks. There is quite a list. But before we work through them do bear in mind most women having an epidural will not develop any

of them. Also, most are a nuisance but are not serious. Serious complications caused by epidurals are exceptionally rare.

I have grouped the potential complications arising from epidural as those that do happen from time to time, those that are uncommon, and lastly those that can be more serious but are also rare.

Firstly, to those that do happen from time to time.

*Doesn't work properly:* Sometimes the epidural has been slotted in but is not working well (darn it!). It may be providing less pain relief on one side of the body or hardly working at all. This can be just plain annoying. It happens roughly 10 per cent of the time.

To try to fix this the anaesthetist can play around with the amount of drug being given through the infusion pump, enlist gravity by repositioning mum to get more drug seeping over to the side where it's not working well, or gently lengthen or shorten the epidural tube within the back to see whether tweaking helps. If none of this works the only unpalatable choices are to tolerate the pain (often, it's still less pain compared to before the epidural was put in) or to take it out and put another one in.

*Drops the blood pressure:* The epidural can block the nerves supplying blood vessels, causing them to relax and dilate. This can drop the mother's blood pressure. Unfortunately, sometimes this drop sometimes has the knock-on effect of reducing blood supply to the placenta (and hence the fetus). The fetus suddenly gets less oxygen flow from mum, doesn't like it and this leads to what we call 'fetal distress'. We are alerted to this by observing the sudden appearance of worrying fetal heart rate patterns on the CTG suspiciously timed with a drop in mum's the blood pressure that happens soon after an epidural is inserted.

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To correct the drop in mum's blood pressure we can pump more fluids into the mum's circulation via a drip in her vein (which is always inserted before we put in the epidural), and if this doesn't solve the issue the anaesthetist can give specialised medications to increase the blood pressure, also through the drip. So, even if a drop in the blood pressure caused by an epidural happens, we can get on top of it. And once the blood pressure is corrected, the fetal condition usually improves and the CTG readout recovers.

*Itch, nausea and shivering:* An epidural can cause itching. However, most women are pretty happy trading horrid, nasty pain with an itch and are not particularly bothered by it. Nausea and vomiting can also happen. For women taking on a green hue we can inject drugs through the drip to rapidly settle the guts.

Shivering happens and we really don't know why exactly. One theory is that the epidural paralyses nerves that control the diameter of blood vessels in the peripheries of the body (such as the arms and legs). These blood vessels respond by dilating wide open which causes a rush of blood from the mum-to-be's inner core to her surface. This shift in blood can cause her to lose heat, make her feel chilly and start shivering.

The shivering is not dangerous and only lasts awhile. To get women comfortable we simply pile on blankets. I can't promise you the blankets we have on offer will be plush, soft or luxurious, but they will be clean and deliciously warm (I dare say those within the throes of labour won't care whether the blankets are authentic cashmere or not).

Now, on to stuff I rate as 'uncommon', affecting 1–2 per cent of those having an epidural.

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*Problems passing urine:* After the birth some women are unable to fully empty their bladder when the urinary catheter is taken out. To deal with this, we rest the bladder then try again the next day. For the small number who still cannot freely urinate on the second go we may need to send them home with a catheter for up to a week to rest the bladder. After this we try once more, and by then bladder function is almost always back to normal. A nuisance when it occurs but it's not dangerous. Just inconvenient.

*A pretty terrible headache:* For around 1 per cent of women who have an epidural or spinal anaesthesia, a postdural puncture headache can occur. And I'm afraid it can be a rather wretched one. A fair bit more intense than the throbbing affairs that build up during a stressful day at the office (though they can be pretty ordinary too). A headache is something that women who have just birthed could really do without.

A postdural puncture headache arises from a persistent leak of cerebral spinal fluid through a microscopic hole in the dura mater during the procedure. Such a hole is intentionally made during the routine spinal anaesthetic procedure (so that the medication can be injected into the correct spot) and inadvertently made by the tip of the introducer needle while the epidural tubing is being positioned next to the dura mater.

The headache is worsened by sitting or standing, and is relieved when lying flat. The tiny hole causing all this headachy misery usually seals up on its own, but recovery can take a meandering seven to ten days. In the meantime, painkillers can certainly be taken.

Strangely, taking caffeine apparently helps – it has long fascinated me how anyone figured this out. Taking caffeine

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may also have a bonus stimulant effect for new mums already struggling with the new reality of little sleep and now burdened with a monster headache. Caffeine certainly does wonders for my (non-postdural puncture) headaches. The caffeine is either taken as a tablet (what's the fun in that?), intravenously (I can see the merits...), or even 'doctor's orders' beverages (the dose required per day is three to four 200 millimetre cups of deliciously brewed coffee, six caffeinated soft drinks ... or 14 cans of Coke, which I wouldn't advise).

If the postdural puncture headache is stupidly painful then the anaesthetist can try an epidural blood patch. This can be highly effective. Around 20 millilitres of blood is taken from mum's vein in the arm then injected into the back, around the region of the leaky dura. The hope is that it will form a blood clot that seals the leak in the dura.

Now some really rare stuff that can be serious.

In around 1 in 4000–5000 of spinals and epidurals the anaesthetic drug in the back can somehow mischievously defy gravity and trickle upwards towards the brain. If it soaks the region around the level of the chest it may transiently paralyse nerves coordinating vital functions that we'd all prefer are left alone to do their thing. Such as breathing. Rarely, it can cause a cardiac arrest needing resuscitation. Sounds like scary stuff and I suppose it is. Luckily, we are talking about something super rare; there were only 16 incidences of cardiac arrest caused by spinal or epidurals among 2.3 million pregnancies in the United Kingdom, according to one study. And bear in mind that for those who have majorly lucked out to find themselves one of the 0.000007 per cent who arrests, it absolutely does

not mean they will snuff it. Remember this will happen at a hospital brimming with highly trained doctors kitted out with medical gear. Mum can be supported until the effects wear off (needless to say, turning off the epidural would be high on the list of management steps). However, things could get a little dramatic if cardiorespiratory resuscitation is needed, as well as other emergency measures. A frightening event unlikely to feature in anyone's birth plan.

Another rare thing that can happen is that an abscess – a small, infected pocket of nasty bacteria and pus – can grow in the epidural space where the epidural tubing once resided. Or in the dura where the spinal needle passed through. It is a pretty delicate spot for an infection and can occasionally cause serious problems, but it can be usually treated effectively with antibiotics which results in a complete recovery.

Now, let's look at some things widely thought to be caused by the epidural (the internet is rife with this stuff) that, in fact, objective research studies examining many thousands of cases haven't managed to confirm a link.

Firstly, the spot where the epidural was placed may throb for a few days, but there is no evidence that epidurals cause a permanent backache. Secondly, many worry about the risk of permanent paralysis. It's an understandable fear as women put two and two together in their mind: needle going into back... hang on a sec, isn't the spinal cord also lurking there somewhere? Reassuringly, there is either no link between an epidural and permanent paralysis, or it's incredibly rare. This makes sense since the epidural catheter is inserted well clear of the spinal cord itself. And the effects of all the anaesthetic drugs we inject are

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transient. According to one reputable medical source it is so rare that they were unable to hazard a guess as to how often it even happens after an epidural. Now that has got to be reassuring. Many anaesthetists will tell women as part of informed consent for an epidural that there is a tiny risk of permanent paralysis from the back down, then quote a really low figure, typically one in 100,000–200,000.

There is a slightly higher risk of a type of nerve injury called a ‘foot drop’, but it’s still rare (1 in 20,000 to 1 in 40,000 risk). This is where there is difficulty lifting the front part of the foot. It can be permanent. Importantly, those affected can still walk about, but the front of the foot may drag down a bit.

Overall, it is pretty safe to say from large epidemiological studies that the risk of permanent paralysis after an epidural or spinal anaesthetic is tiny.

There is most definitely a rumour actively promulgated – one that has been bouncing about for eons – that a major downside of an epidural is that it increases the chances of medical interventions such as forceps or caesarean sections. This is so widely regarded to be universal truth that many birth classes of today (and of tomorrow) have educators declaring, ‘Have an epidural at your peril as it will slow labour and ratchet up your chances of a forceps or a caesarean section. Sure, have one if you really can’t bear the pain but it will rob you of a dream natural birth.’ In fact, an objective look at the medical evidence has not uncovered a convincing link between an epidural and an increased risk of medical interventions.

One of the highest levels of synthesising medical evidence is a rigid scientific method called a systematic meta-analysis.

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It gathers all the published scientific evidence on a topic via a meticulous, systematic search strategy. Using a strict (and dispassionate) statistical approach, the results of all these studies are combined to answer important clinical questions. They can be pretty boring to do (luckily, there are altruistic folk out there who are willing to do them for our benefit, such as enthusiastic junior members of my research team), but the method makes a lot of sense. For example, the larger studies with more participants will more heavily sway the findings.

A systematic meta-analysis published in 2018 combined the findings of many studies and tallied the outcomes of over 10,000 pregnancies. The results were clear: having an epidural was not associated with higher rates of caesars compared with epidural free labours (in this study the comparator group were those opting for opioids instead of an epidural). Reassuringly, the study also concluded having an epidural did not up the risk of having an instrumental birth either (forceps or vacuum birth).

Many will be rather surprised by this. And I suspect many health professionals who work in birth suites simply won't believe these results and will continue informing women that epidurals increase their risk of medical interventions. I understand why this may be; we have all seen women with long labours offered an epidural only to wind up with a caesarean section many hours after. However, even decades of personal clinical experience accumulated by one doctor or midwife cannot match the objective analysis of evidence from 10,000+ women to credibly dispute the objective findings of this important 2018 research study.

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To summarise, the big advantage of an epidural is that it can powerfully quash the pains of childbirth. Also, having a working epidural can make instrumental births more comfortable if they are needed. And if a caesar is required, a drug ‘top-up’ can be conveniently added into the epidural before the procedure.

The drawbacks are that women cannot freely move about the birth suite, and will need a drip in the vein and a catheter in their bladder. They may shiver, itch or spew. Other risks that are uncommon include a drop in the blood pressure, a wretched headache lasting days or difficulties urinating in the days following childbirth. There is a tiny risk of foot drop and a vanishingly small risk of permanent paralysis.

All in all, epidurals and spinal anaesthetics really are very safe. Recent studies dispense with the myth that it leads to more caesars, forceps or vacuum births (though some will never be convinced of this).



It really does suck that humans are constructed in a way where labour really hurts. It would have been so much more convivial if instead, uterine contractions felt like a tight squeeze and relaxation without all the needless pain thrown in (I can't see why that wouldn't work). But sadly, that's not the case.

However, there are diverse options to deal with the pain of labour which we have now covered: from pretend flickering candles to opium extracts from poppy plantations; AC/DC to aromatherapy; TENS machines to inhaling a similar gas that rev-

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heads use to add kick to their hotted-up automobiles. Of course, there is also the epidural.

Before we move to the main event – labour – can I impart two final thoughts? Firstly, it is absolutely okay for women to play it by ear and not make firm decisions beforehand. For those who feel this option is for them, I trust this chapter will be particularly useful as it provides sound knowledge to make informed pain relief choices on the fly.

Secondly, the choice of pain relief rests solely with the labouring woman. If this is you, please remember this. If you decide an epidural is what you want, go for it (I support you). Cast aside strident views voiced by friends and family during the pregnancy. And if you are a support person, offer your thoughts if asked, but leave the decision to the person actually trying to give birth. And enthusiastically endorse her choice.

## Recap: Options for pain relief

1. Pain is both an unpleasant emotional and sensory experience. Countering the emotional response is important and explains why many drug-free strategies are effective. As for the sensory experience of pain, most options take the edge off the pain (to varying degrees). An epidural is the only option that entirely removes the sensation of pain.
2. There are a host of drug-free options that women can try. For many, these are all that's needed, especially those blessed with a rapid labour. They include having trusted support people in the room (birth partner, friends, family, a doula), altering the ambience of the room (candles, music, aromatherapy), breathing techniques, bouncing on a birth ball, adopting different positions, a bath or shower, water injections into the lower back, acupuncture or a TENS machine.
3. The skilled midwife can work with labouring women to try out some of these options.
4. Inhaling nitrous oxide (or 'laughing gas') is an option that works well for some. It's very safe but its effectiveness is variable. Sucked in during contractions, it can elicit light-headedness or even euphoria (for some lucky ones).
5. An injection of an opiate-based drug (mainly morphine) is a pharmacological option. There is good evidence that opiates can blunt the sensory experience of pain, but they commonly

cause vomiting (we administer anti-spew drugs to counter this). Also, they can cross the placenta, making some newborns a little drowsy at birth. At times it will mean the baby needs a little resuscitation at birth, but it's often short-lived and the baby perks right up when the drug wears off.

6. The epidural is the only option that decisively removes the pain of labour. A seriously thin tube is inserted low down in the back (well clear of the nerve bundle that is the spinal cord) and medication is continuously dribbled in. It is left to run until labour is over.
7. Women having an epidural will need an intravenous drip, and a catheter to keep their bladder empty. Also, most will be lounging in bed as the epidural can affect control of the legs.
8. Epidurals are very safe but there are some risks. The more common ones are that it doesn't work properly; causes a transient drop in mum's blood pressure (which can sometimes upset the baby, but we can correct it); and it can cause itching, shivering or vomiting. Less common side effects include a terrible headache and difficulty passing urine in the days following birth. Permanent footdrop is rare (1 in 40,000) and permanent paralysis is stupidly rare.
9. It is reassuring that studies haven't found a link between epidurals and an increased risk of medical procedures such as forceps, ventouses or caesars.

## Chapter 3

# Warming up the engine: going into labour spontaneously or with a little help

**T**hanks for sticking around. By this time, I hope readers feel like they are prising open the mysterious black box that is the birth suite – that mystical place where pregnant women step in, the doors close, stuff happens, and they emerge cradling a small human. One that squawks a lot, is not one bit continent and is infuriatingly partial to late night snacking. But precious and loved the moment it arrives.

Chapter 1 provided a bird's eye view of birth: the major players (placenta, uterus, baby), a timeline of events and an overview of what happens in the birth suite. In Chapter 2, we mulled over the various choices on offer to counter the pain of labour. Over the next few chapters, we will finally turn to the task at hand. Labour.

This chapter covers how labour begins. I talk about the fascinating shape-shifting process of 'cervical ripening', a prelude to active labour. I look at strategies widely believed to kickstart natural labour, from eating spicy foods to vigorous exercise, acupuncture and even guzzling castor oil. And pause to reflect how effective they really are. I will also walk through how we